

PATENT ABSTRACTS OF JAPAN

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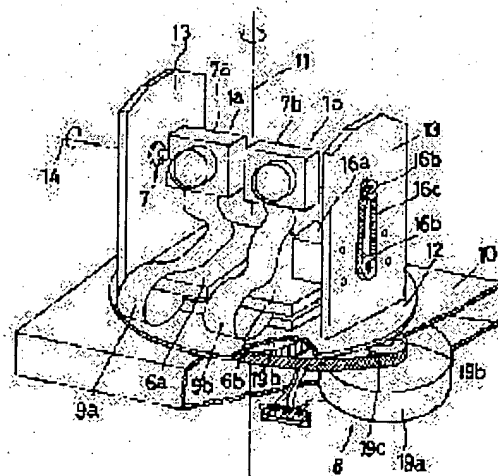
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(54) PHOTOGRAPHING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent the response of the visual field of a photographic camera device to a visual field direction indication signal from being delayed.

SOLUTION: Of photographic camera devices 1a and 1b having carriers 6a and 6b for circuits connected to image pickup elements, the image pickup elements and the circuits on the carriers 6a and 6b are electrically connected so that the image pickup elements and carriers 6a and 6b can relatively move. The image pickup elements are driven and swiveled on the pitch axis 14 of the photographic camera devices 1a and 1b to and away from the carriers 6a and 6b and then when the visual fields of the photographic camera devices 1a and 1b are moved, the swiveled parts are reduced in inertial mass.



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CLAIMS

[Claim(s)]

[Claim 1] It is photography equipment characterized by to be electrically connected so that that image sensor and support may move relatively that image sensor and circuit on support in the photography camera equipment which has the support of the circuit connected to an image sensor and this image sensor, and for the means which carries out the revolution drive of that image sensor to support at the circumference of the pitching axis of that photography camera equipment to be established, and for the visual field of photography camera equipment to move by revolution of that image sensor.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is suitable for moving the visual field of photography camera equipment according to a motion of the observer's head, when making an observer's visual field region carry out image formation of the image photoed at the distant place with a head wearing mold display, concerning the photography equipment to which the line of sight of photography camera equipments, such as a CCD camera, can be changed.

[0002]

[Description of the Prior Art] Drawing 4 and drawing 5 show the photography equipment for operating a work device 101 with a remote control 105 in a stricken area etc., and are equipped with the photography equipment which has two photography camera equipments 102a and 102b in which an output of the compound video signal which added the synchronizing signal to the video signal outputted from an image sensor is possible, and the head wearing mold display 104 which an observer 103 carries. The display 104 makes the eye of an observer's 103 method of Uichi Hidari check the photography image by one photography camera equipment 102a by looking, and makes the eye of an observer's 104 right-and-left another side check the photography image by photography camera equipment 102b of another side by looking. Thereby, an observer 103 can operate a work device 101, checking a photographic subject by looking as a solid image. In addition, the indicating equipment 104 has a visor 106, it is displacing the visor 106 up, an observer 103 can check not only a photography image but forward-viewing Nouchi's actual object by looking, and only a photography image can be checked by looking by displacing a visor 106 caudad.

[0003] The head wearing mold display 104 has the head-motion sensor (illustration abbreviation) which detects a motion of an observer's 103 head, moves the visual field of both the photography camera equipments 102a and 102b by making the signal from the head-motion sensor into a line-of-sight directions input signal, and changes bearing of the exposure axis. Therefore, the starting device which operates both the photography camera equipments 102a and 102b is formed.

[0004] The electrode holder 111 with which, as for the conventional starting device, each cross direction holds both the photography camera equipments 102a and 102b so that it may become parallel mutually as shown in drawing 3, The buttress plate 113 of the pair which supports the electrode holder 111 possible [revolution] to the circumference of the pitching axis 112 of both the photography camera equipments 102a and 102b, The rotary table 115 which supports the 1st servo motor 114 which carries out the revolution drive of the electrode holder 111, and the electrode holder 111 and buttress plate 113 holding both the photography camera equipments 102a and 102b, and the 1st servo motor 114, It has the 2nd servo motor 117 revolved in the rotary table 115 to the circumference of the yawing axis 116 which intersects perpendicularly with said pitching axis 112. In addition, the pitching axis of photography camera equipment means the shaft from which the visual field of photography camera equipment changes with revolution of the pitching-axis core up and down.

[0005] By driving the 1st servo motor 114 with a control unit (illustration abbreviation) according to the line-of-sight directions input signal from a head-motion sensor, it circles in the visual field of both the photography camera equipments 102a and 102b to the circumference of a pitching axis 112. By driving the 2nd servo motor 117 with a control device according to the line-of-sight directions input signal from a head-motion sensor, it circles in the visual field of both the photography camera equipments 102a and 102b to a pitching axis 112 at the circumference of the right-angled yawing axis 116.

[0006]

[Problem(s) to be Solved by the Invention] Since the visual field of the photography camera equipments 102a and 102b is moved, when a motion of an observer's 103 head is sudden, a motion of the visual field will be overdue [by making it circle in the pitch direction in photography camera equipment 102a and the whole 102b,] with the conventional configuration, to a line-of-sight directions input signal under the effect of the inertial mass of the photography camera equipments 102a and 102b. Moreover, if the inertial mass of the photography camera equipments 102a and 102b becomes large, in order to also enlarge the 1st servo motor 114, also when making it circle in the direction of a yaw in a rotary table 115 and changing the visual field of the photography camera equipments 102a and 102b, a motion of the visual field will be overdue to a line-of-sight directions input signal. Therefore, there was a problem that an observer 103 sensed sense of incongruity.

[0007] This invention aims at offering the photography equipment which can solve the above-mentioned technical problem.

[0008]

[Means for Solving the Problem] It is electrically connected with an image sensor in the photography camera equipment which has the support of the circuit connected to this image sensor so that that image sensor and support may move relatively that image sensor and circuit on support, and the means which carries out the revolution drive of that image sensor to support at the circumference of the pitching axis of that photography camera equipment is established, and the photography equipment of this invention is characterized by for the visual field of photography camera equipment to move by revolution of that image sensor.

[0009] According to the configuration of this invention, the visual field of the photography camera equipment can be moved by carrying out a revolution drive at the circumference of a pitching axis to the support of the circuit where the image sensor in photography camera equipment is connected to the image sensor. That is, compared with making it circle in the whole photography camera equipment the circumference of a pitching axis, an inertial mass can be decreased by the support by distributing the weight of photography camera equipment. Thereby, the responsibility of the motion of the visual field of photography camera equipment to a line-of-sight directions input signal can be improved.

[0010]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0011] The photography equipment shown in drawing 1 is equipped with the head wearing mold display 3 with which two photography camera equipments 1a and 1b in which ejection is possible, and an observer 2 equip with a compound video signal.

[0012] Each photography camera equipments 1a and 1b have the printed circuit boards (support) 6a and 6b by which the taking-lens systems 5a and 5b which carry out image formation of the image of a photographic subject, and the circuit connected to the CCD 4a and 4b are formed on the light-receiving side of CCD (image sensor) 4a and 4b and its CCD 4a and 4b. each photography camera equipments 1a and 1b -- it is alike, respectively and sets, and CCD 4a and 4b and the taking-lens systems 5a and 5b are built in housing, and constitute the camera heads 7a and 7b as shown in drawing 2 . It connects electrically through the path cords 9a and 9b, such as a cable which has flexibility, and, thereby, the image sensors 4a and 4b and printed circuit boards 6a and 6b can move relatively the image sensors 4a and 4b and the circuit on printed circuit board 6a and 6b.

[0013] The CCD 4a and 4b changes into a video signal the optical image by which image formation was carried out on the light-receiving side. The circuit on each printed circuit board 6a and 6b consists of clock generators 41a and 41b, sample hold circuits 42a and 42b, and video-signal processing circuits 43a and 43b. The clock generators 41a and 41b output the pulse for carrying out synchronous actuation to the driver, the sample hold circuits 42a and 42b, and the video-signal processing circuits 43a and 43b of CCD 4a and 4b. The video-signal processing circuits 43a and 43b process the video signal outputted from CCD 4a and 4b through sample hold circuits 42a and 42b, for example, output a compound video signal like an NTSC composite video signal.

[0014] It is attached in a starting device 8 as it is indicated in drawing 2 as the camera heads 7a and 7b and printed circuit boards 6a and 6b.

[0015] That starting device 8 has the base 10, the rotary table 12 attached in this base 10 possible [revolution at the yawing-axis 11 core], and the supporter material 13 of the pair fixed to this rotary table 12. Both the camera heads 7a

and 7b are attached in pitching-axis 14 core possible [revolution] through shaft 7', and printed circuit boards 6a and 6b are fixed to the supporter material 13 on the rotary table 12.

[0016] two photography camera equipments 1a and 1b -- each line of sight -- mutual -- etc. -- it spreads -- the direction of an optical axis of each taking-lens systems 5a and 5b is mutually made parallel, and a pitching axis 14 is used as a right angle to the line of sight so that it may become. The pitching axis 14 and the yawing axis 11 of the rotary table 12 cross at right angles in the center of both the camera heads 7a and 7b. Thereby, revolution of both the camera heads 7a and 7b in the pitch direction is enabled, and the visual field of both the photography camera equipments 1a and 1b moves in the pitch direction by the revolution. Moreover, it is supposed that the revolution to the circumference of the shaft which intersects perpendicularly with the pitching axis 14 of a yaw, i.e., the direction, is possible for both the camera heads 7a and 7b and printed circuit boards 6a and 6b, and the visual field of both the photography camera equipments 1a and 1b moves in the direction of a yaw by the revolution.

[0017] The means which carries out the revolution drive of both the camera heads 7a and 7b to printed circuit boards 6a and 6b at the circumference of a pitching axis 14 is established. That is, 1st servo motor 16a is attached in one side of the supporter material 13, and pulley 16b and timing-belt 16c which transmit rotation of this 1st servo motor 16a to said shaft 7' which supports both the camera heads 7a and 7b are prepared. Moreover, the means which carries out a revolution drive at the circumference of a yawing axis 11 by making both the camera heads 7a and 7b and printed circuit boards 6a and 6b into one is established. That is, pulley 19b of that rotary table 12 which transmits rotation of 2nd servo motor 19a and this 2nd servo motor 19a to the support shaft (illustration abbreviation) of a rotary table 12 caudad, and timing-belt 19c are prepared.

[0018] As shown in drawing 1, the head wearing mold display 3 has the displays 21a and 21b of a right-and-left pair, and the attaching part 22 for head wearing holding both the displays 21a and 21b.

[0019] The attaching part 22 is considering as a helmet, a band configuration, etc., and wearing of it on an observer's 2 head is enabled, and it positions both the displays 21a and 21b in a fixed location to an observer's 2 visual field by the wearing.

[0020] Each displays 21a and 21b have the display devices 26a and 26b, such as CRT and a liquid crystal display panel, the display controls 27a and 27b of each display devices 26a and 26b, and optical system, respectively. Each display controls 27a and 27b send the compound video signal sent through a cable from each photography camera equipments 1a and 1b to each display devices 26a and 26b. Each display devices 26a and 26b display the image corresponding to the video signal which each CCD 4a and 4b outputs. Each optical system has lens systems 29a and 29b, Mirrors 30a and 30b, the 1st combiner 31a and 31b, and the 2nd combiner 32a and 32b. The display light of the image displayed by each display devices 26a and 26b converges while it is reflected by Mirrors 30a and 30b and the 1st combiner 31a and 31b through lens systems 29a and 29b and being reflected by the 2nd combiner 32a and 32b, it penetrates the 1st combiner 31a and 31b, and is led to an observer's 2 eyes. By this, the photography image by one photography equipment 1a is checked by looking by the eye of an observer's 2 method of Uichi Hidari, the photography image by photography equipment 1b of another side is checked by looking by the eye of an observer's 2 right-and-left another side, and a photographic subject is perceived as a solid image. In addition, in the front of the 2nd combiner 32a and 32b, a visor 35 is attached in an attaching part 22 possible [vertical movement]. By displacing the visor 35 up, an observer 2 can also check forward-viewing Nouchi's actual object by looking not only through a photography image but through the combiners 31a, 31b, 32a, and 32b, and only a photography image can be checked by looking by displacing a visor 35 caudad.

[0021] The head-motion sensor 30 which detects a motion of the observer's 2 head is formed. The coil with which the head-motion sensor 30 is attached in the well-known thing 22, for example, an attaching part, What [outputs the signal corresponding to change of the current by having a means to generate a field and a coil moving the inside of a field to the surroundings of the coil] Using the transmitter and receiver of a supersonic wave, a transmitter can be attached in a fixed side, a receiver can be attached in an attaching part 22, and what outputs the signal according to change of the time of concentration from the transmitter of the supersonic wave by motion of a receiver to a receiver can be used. The signal corresponding to a motion of an observer's 2 head detected by the head-motion sensor 30 is transmitted to the control unit 31 of said 1st and 2nd servo motor 16a and 19a. Thereby, the 1st and 2nd servo motor 16a and 19a can be driven by making the signal according to a motion of an observer's 2 head into a line-of-sight directions input signal. By namely, the thing for which the 1st servo motor 16a is driven according to a line-of-sight directions input signal By both the camera heads 7a and 7b circling, and the visual field of the photography camera equipments 1a and 1b moving

in the pitch direction, and driving the 2nd servo motor 19a according to a line-of-sight directions input signal Both the camera heads 7a and 7b and printed circuit boards 6a and 6b circle, and the visual field of both the photography camera equipments 1a and 1b moves in the direction of a yaw.

[0022] According to the above-mentioned configuration, the visual field of the photography camera equipments 1a and 1b can be moved by carrying out the revolution drive of CCD 4a and 4b to printed circuit boards 6a and 6b at the circumference of a pitching axis 14. That is, compared with making it circle in photography camera equipment 1a and the whole 1b the circumference of a pitching axis, only the part of the printed circuit boards 6a and 6b can decrease an inertial mass by distributing the weight of the photography camera equipments 1a and 1b. Thereby, the responsibility of the motion of the visual field of the photography camera equipments 1a and 1b to a line-of-sight directions input signal can be improved. Moreover, since 1st servo motor 16a is miniaturized and an inertial mass can be made small compared with making it circle in photography camera equipment 1a and the whole 1b the circumference of a pitching axis, also when making it circle in CCD 4a and 4b and printed circuit boards 6a and 6b and moving the visual field of the photography camera equipments 1a and 1b in the direction of a yaw, the response delay over a line-of-sight directions input signal can be prevented. It can prevent that a motion of a visual field is not overdue to a sudden motion of an observer's 2 head by this, and an observer 2 senses sense of incongruity.

[0023] In addition, this invention is not limited to the above-mentioned operation gestalt. For example, although the above-mentioned operation gestalt showed CCD as an image sensor, other solid state image sensors and camera tubes may be used. Moreover, what is necessary is especially not to limit whether which circuit is established in a support side, for example, to revolve an image sensor and one in a sample hold circuit to the circumference of a pitching axis, to, prepare a part of circuit of photography camera equipment on support in short, and just to dissociate from an image sensor, although it dissociated with the image sensor and the clock generator, the sample hold circuit, and the video-signal processing circuit were prepared on support with the above-mentioned operation gestalt. Moreover, the communication interface of the photography camera equipments 1a and 1b and the head wearing mold display 3 may be the wireless structure using the space transmission means by the electric wave or light. Any may be the objects for right eyes in the object for left eyes, and the location of the photography camera equipments 1a and 1b may have [the photography camera equipments 1a and 1b] reverse any by the image transformation approach. Rotation transfer of each motors 16a and 19a is not limited to what uses a belt, but a gear may be used or the direct rotation transfer of it may be carried out.

[0024]

[Effect of the Invention] According to the photography equipment of this invention, the response delay of the motion of the visual field of photography camera equipment to a line-of-sight directions input signal can be prevented.

[0025]

[The embodiment of this invention] In this invention, it is desirable that the means which carries out a revolution drive by making an image sensor and support into one at the circumference of a yawing axis right-angled to a pitching axis is established. According to this invention, compared with making it circle in the whole photography camera equipment the circumference of a pitching axis, the motor which carries out the revolution drive of the image sensor to support at the circumference of a pitching axis is miniaturized, and an inertial mass can be made small. Therefore, by making an image sensor and support into one, also when carrying out a revolution drive and moving the visual field of photography camera equipment to the circumference of a yawing axis in the direction of a yaw, the response delay over a line-of-sight directions input signal can be prevented.

[0026] Moreover, two photography camera equipments are arranged so that each line of sight may become equal mutually. The head wearing mold display which makes the eye of an observer's right-and-left another side check the photography image by the photography camera equipment of another side by looking while making the eye of an observer's method of Uichi Hidari check the photography image by one photography camera equipment by looking. It is desirable that a means to detect a motion of the observer's head is established, and a revolution driving means drives with the signal according to a motion of the head. Thereby, when driving each driving means according to a motion of an observer's head, it can prevent that the motion of a visual field to a sudden motion of an observer's head is not overdue, and an observer senses sense of incongruity.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The configuration explanatory view of the photography equipment of the operation gestalt of this invention

[Drawing 2] The perspective view of the starting device of the operation gestalt of this invention

[Drawing 3] The perspective view of the starting device of the conventional camera head

[Drawing 4] The perspective view showing the example of use of a head wearing mold display

[Drawing 5] The perspective view showing the example of use of photography equipment

[Description of Notations]

1a, 1b Photography camera equipment

4a, 4b CCD (image sensor)

6a, 6b Printed circuit board (support)

11 Yawing Axis

14 Pitching Axis

16a The 1st servo motor

41a, 41b Clock generator

42a, 42b Sample hold circuit

43a, 43b Video-signal processing circuit

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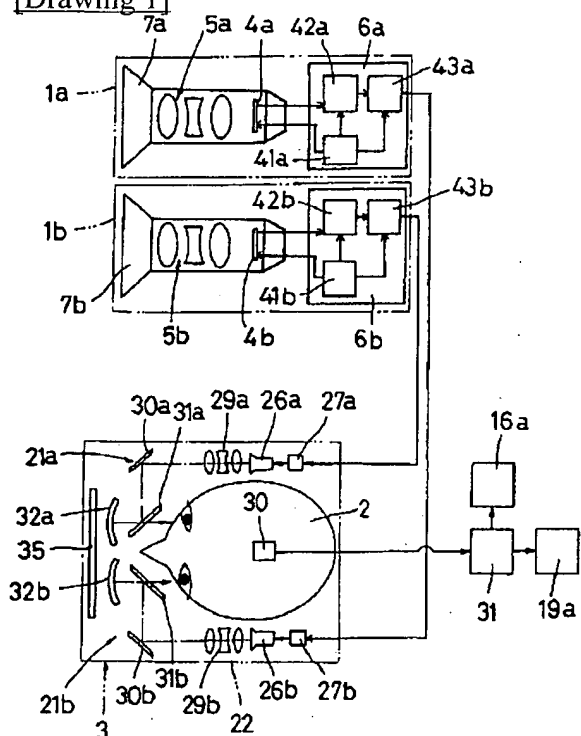
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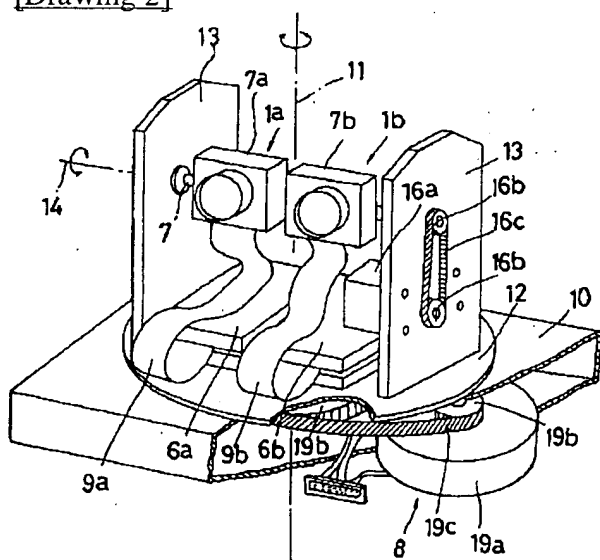
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DRAWINGS

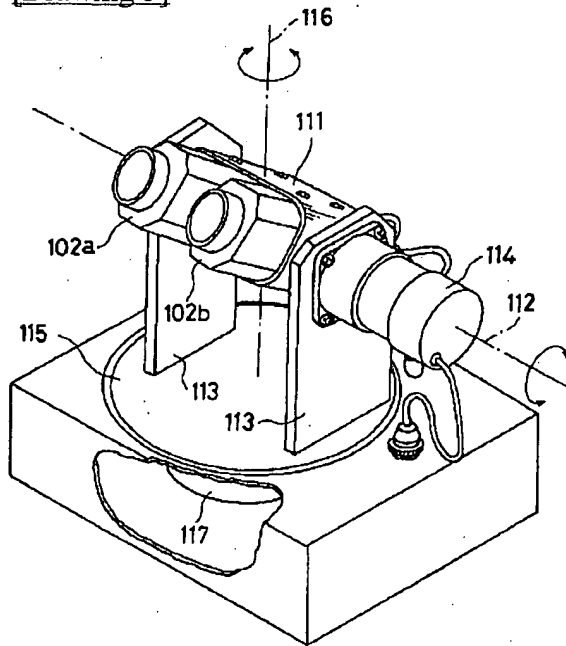
[Drawing 1]



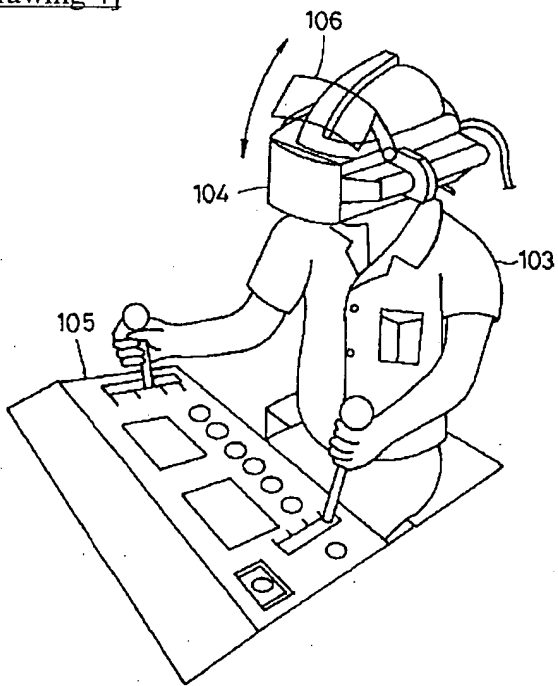
[Drawing 2]



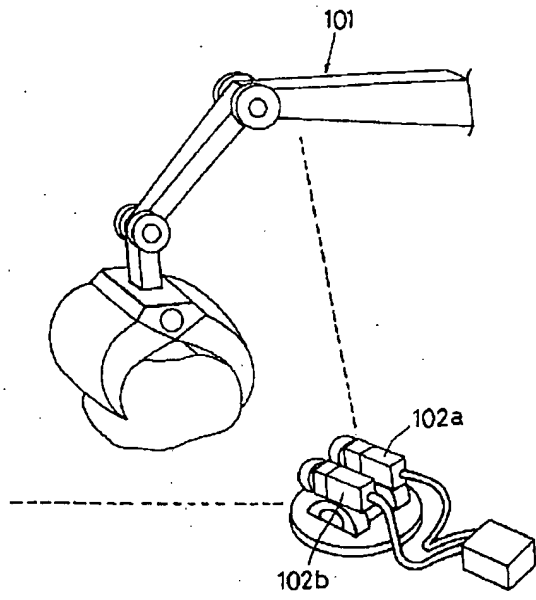
[Drawing 3]



[Drawing 4]



[Drawing 5]



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